APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/629,085	07/31/2000	Peter C. Damron	SUN-P4935	4971

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EXAMINER
BRAGDON, REGINALD GLENWOOD

ART UNIT	PAPER NUMBER
2188	

DATE MAILED: 04/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 August 2002 and 30 September 2002* .

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____ .

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2* .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Information Disclosure Statement

1.   The Information Disclosure Statement(s) received 26 August 2002 has been considered.

Please see the attached PTO-1449(s).

Drawings

2.   The drawings filed on 31 July 2000 have been approved by the Examiner.

Specification

3.   The disclosure is objected to because of the following informalities:

It appears that much of the subject matter disclosed from page 10, line 9, to page 11 (last

line) essentially repeats information already set forth previously. Applicant should consider

deleting any unnecessary, repeated information.

Appropriate correction is required.

Claim Objections

4.   Claims 1-8, 10-18 are objected to because of the following informalities:

As per claim 1, line 5, "said associated TLB" should be --an associated TLB--.

As per claim 1, line 8, --into an associated TLB-- should added after "input".

As per claim 1, line 9, "within" should be --associated with--.

As per claim 8, line 6, "said associated TLB" should be --an associated TLB--.

As per claim 8, line 9, --into an associated TLB-- should added after "input".

As per claim 8, line 10, "within" should be --associated with--.

As per claim 10, line 2, "said associated TLB" should be --an associated TLB-- since no particular "associated TLB" has been set forth.

As per claim 11, line 2, "said associated TLB" should be --an associated TLB-- since no particular "associated TLB" has been set forth.

As per claim 12, line 9, --a-- should be added after "generating".

All dependent claims are objected to as having the same deficiencies as the claims they depend from.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6.   Claims 12-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As per claim 12, line 8, "its" lacks clear antecedent basis.

As per claim 12, line 10, "said access data" lacks antecedent basis since no "access data" has been set forth previously.

All dependent claims are rejected as having the same deficiencies as the claims they depend from.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 3, and 6-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Moore et al. (5,437,017).

As per claims 1 and 8, Moore et al. teaches a multiprocessor system, where each processor 10 includes a TLB 40 and each processor is connected to a bus 8 ("main communications network"). See figure 1. The TLB 40 is used to translate a virtual address to an associated real ("physical") address ("accessing a virtual address…" and "locating an associated physical address…"). See column 2, lines 7-11. In response to invalidating an entry in a particular TLB ("said second entry was removed"), a TLB invalidate (TLBI) instruction ("TLB message") is sent to the bus ("sending a TLB message from one of said plurality of processors to said main communication network"; see column 3, lines 5-8) and then to the other processors on the bus ("sending said TLB message from said main communication network to said plurality of processors"). See column 3, lines 8-16.

As per claims 3 and 6-7, Moore et al. teaches that the invalidate instruction is performed as a result of a modification of a translation relationship (i.e. "write access of said second entry" or "comparing said second entry…if said second entry affects said address data stored therein") and therefore all copies of the entry should be invalidated. See column 7, lines 7-18.

Claim Rejections - 35 USC § 103

9.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

10.   Claims 9-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al.

(5,524,216) in view of Moore et al.

As per claims 9 and 12, Chan et al. teaches a plurality of processors 21-22, 26-27 (figure

1), where each processor includes a cache and a TLB (see column 2, lines 62-66). With

reference to figure 1, the system includes a plurality of local buses 20, 25 ("independent paths")

connected to central bus 10 ("main communication network"). The TLB in a processor is

inherently used in performing a data access. Chan et al. further teaches transmitting transactions

between processors over the local buses and the central bus.

Chan et al. does not specifically teach a generating a TLB "message" which is

transmitted to other TLBs within the system. Moore et al. teaches that it was known to generate

a TLB invalidate instruction ("TLB message") which is broadcast to other processors in a system

over a main bus in order to invalidate an entry in a TLB. See column 3, lines 5-11. It would

have been obvious to one of ordinary skill in the art to have modified Chan et al. to transmit TLB

invalidate coherency instructions between the processors, as suggested by Moore et al., because

the transmission of a TLB invalidate instruction would maintain coherency without requiring

inter-processor interrupts (see column 2, lines 43-47), thereby improving system performance.

As per claims 10, 14, and 17, the combination of Chan et al. and Moore et al. does not teach reading correct data from the page tables in memory on a TLB miss. However, it would have been obvious to one of ordinary skill in the art to have read the correct translation data from main memory on a TLB miss using a read access message from the TLB in order to have maintained efficiency in the system by keeping frequently accessed translations in the TLB.

As per claims 11, 13, 15, and 18, Moore et al. teaches that the invalidate instruction is performed as a result of a modification of a translation relationship (i.e. "write access of said second entry" or "comparing said second entry...if said second entry affects said address data stored therein") and therefore all copies of the entry should be invalidated. See column 7, lines 7-18.

As per claim 16, Moore et al. teaches performing a TLB invalidate operation in response to relocating ("moving") data or instructions within system memory. See column 7, lines 13-15.

11.   Claims 2 and 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al.

As per claims 2 and 4-5, Moore et al. does not teach reading correct data from the page tables in memory on a TLB miss. However, it would have been obvious to one of ordinary skill in the art to have read the correct translation data from main memory on a TLB miss using a read access message from the TLB in order to have maintained efficiency in the system by keeping frequently accessed translations in the TLB.

Conclusion

12.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

Chang et al. (6,119,204) teaches TLB synchronization.

13.   Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

The fax phone numbers for the organization where this application or proceeding
is assigned are as follows:

(703) 746-7238   (After Final Communications)
or
(703) 746-7239   (Official Communications)

(703) 746-7240   (For Status inquiries, draft communications)
and/or
(703) 746-5693   (Use this FAX#, only after approval by the Examiner, for
"INFORMAL" or "DRAFT" communications. An Examiner may request that a formal
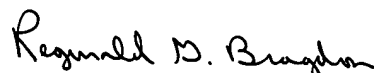page/amendment be faxed directly to them on occasion).

Hand-delivered responses should be brought to Crystal Park II, 2121
Crystal Drive, Arlington, VA., Fourth Floor (receptionist).

14.   Any inquiry concerning this communication or earlier communications from the
examiner should be directed to Reginald G. Bragdon whose telephone number is (703) 305-
3823. The examiner can normally be reached on Monday-Thursday from 7:00 AM to 4:30 PM
and every other Friday from 7:00 AM to 3:30 PM.

The examiner's supervisor, Matthew Kim, can be reached at (703) 305-3821.

Any inquiry of a general nature or relating to the status of this application should be
directed to the Group receptionist whose telephone number is (703) 305-3900.

Reginald G. Bragdon
Primary Patent Examiner
RGB   Art Unit 2188
April 8, 2003